

WHAT IS CLAIMED IS:

1. A process variable transmitter, comprising:
 - a transmitter output circuit providing bidirectional HART and controller area network communication transceiver lines and sensor circuit interface contacts; and
 - an isolated circuit coupled to the sensor circuit interface contacts and comprising sensor circuitry sensing a process variable, the isolated circuit further comprising a galvanic isolation barrier galvanically isolating the sensor circuitry from the HART and controller area network transceiver lines.
2. The process variable transmitter of Claim 1 wherein the sensor circuitry includes first and second low level power supply conductors and a voltage difference between the first and second low level power supply conductors is not more than 5.5 volts.
3. The process variable transmitter of Claim 2, further comprising an electrostatic shield surrounding the sensor circuitry and connected to the first low level power supply conductor.

4. The process variable transmitter of Claim 3, comprising a process fluid inlet that is electrically connected to the electrostatic shield.

5. The process variable transmitter of Claim 3 wherein the electrostatic shield includes a terminal on an outer surface of the transmitter that is connectable to process ground.

6. The process variable transmitter of Claim 1 wherein the isolated circuit includes a galvanically isolated power supply that comprises a first portion of the isolation barrier.

7. The process variable transmitter of Claim 6 wherein the galvanically isolated power supply includes a transformer that comprises a first and second transformer windings that are electrically insulated from one another.

8. The process variable transmitter of Claim 6 wherein the isolated circuit further comprises a galvanically isolated serial bidirectional communication circuit that comprises a second portion of the isolation barrier.

9. The process variable transmitter of Claim 8 wherein the galvanically isolated serial

bidirectional communication circuit comprises an isolation transformer.

10. The process variable transmitter of Claim 8 wherein the galvanically isolated serial bidirectional communication circuit comprises an optical isolator.

11. A transmitter that controls a loop current, comprising:

- positive and negative leads carrying the loop current, the loop current including first, second, third and fourth currents in the transmitter;

- a loop current controller that includes a resistor that carries the first current and that controls the first current as a function of both a process variable and a sense voltage at the resistor;

- a first regulator coupling to the positive lead, providing a first voltage, and coupling the second current through the resistor;

- a second regulator coupling to the first voltage, providing a second voltage, and coupling the third current through the resistor;

- a first load that carries a first load current between the first voltage and the second voltage;

- a second load that includes a controller area network load, and that couples a second load current between the second voltage and the negative lead, the second load current bypassing the resistor; and
- the loop current controller sensing the second voltage to correct the first current for the load current that bypasses the resistor.
12. The transmitter of Claim 11 wherein the first and second loads are stacked in an electrical series circuit, and at least a portion of the first load current passes through the second load.
13. The transmitter of Claim 11 wherein the sum of the first load current and the second load current exceed a lower limit of the loop current.
14. The transmitter of Claim 11 wherein the first and second load have load characteristics that are not matched to the supply characteristics of the loop current.
15. The transmitter of Claim 11 wherein the loop current controller controls the first current based on feedback so that the loop current indicates the process variable.

16. A process variable transmitter connectable to a loop, comprising:

- controller area network output connections including a CAN bus contact and a common contact;

- a current limiter circuit drawing a supply current and providing a stored energy output; the supply limiter circuit providing a supply current limit;

- a recessive driver circuit drawing a drive current from the stored energy output and coupling the drive current to the CAN bus contact, the recessive driver circuit providing a drive current limit; and

- a dominant driver circuit coupled to the CAN bus.

17. The process variable transmitter of Claim 16 wherein the current limiter circuit comprises a bulk capacitor.

18. The process variable transmitter of Claim 16 wherein the supply current limit is set so as to not disrupt the functioning of the current loop.

19. A process variable transmitter, comprising:

- a microcontroller energized by a first power supply rail;

- an EEPROM circuit storing controller area network configuration data received from the microcontroller; and
 - a controller area network circuit energized by a second power supply rail, and receiving the controller area network configuration data from the microcontroller; and the energization of the first power supply rail is sequenced to fall after the energization of the second power supply rail when the transmitter is de-energized.
20. The process variable transmitter of Claim 19 wherein the first power supply rail is energized before the second power supply rail when the transmitter is energized.
21. The process variable transmitter of Claim 20 wherein the first power supply rail comprises low pass RC filters for decoupling spikes.
22. The process variable transmitter of Claim 19 wherein the controller area network circuit includes a KEYS circuit that interrupts CAN communication when keys of a local operator interface are pressed.
23. The process variable transmitter of Claim 19 wherein the microcontroller is energized at startup before the controller area network circuit.

24. The process variable transmitter of Claim 23 wherein the microcontroller remains energized at shutdown after the controller area network circuit is de-energized.

25. A process variable transmitter, comprising:

- a microcontroller;

- a controller area network circuit that is coupled to the microcontroller and provides current to an external CAN bus; and

- a diagnostic circuit coupled to the controller area network circuit and sensing the current to the external CAN bus; the diagnostic circuit providing a diagnostic output to the controller indicating that current is in excess of a set limit.

26. The process variable transmitter of Claim 25 wherein the diagnostic circuit comprises a transistor having an emitter coupled to the controller area network circuit, and a collector connected to the diagnostic output.

27. The process variable transmitter of Claim 26 wherein the diagnostic circuit further comprises a resistor couples between the collector and a DC common.